THE DIAGNOSIS OF CANCER OF THE INTESTINES.[1]

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In considering the cause of any chronic digestive disorder, cancer can never be left entirely out of account. It is always a possibility in any patient over thirty years of age; always the most likely explanation in any patient over forty; and never can be eliminated from the calculation until after all the evidence has been obtained and carefully weighed. But cancer is not equally distributed throughout the digestive tract. In fact, it exhibits a decided partiality for some regions and a decided neglect for others, so that a knowledge of this peculiarity aids us if we can trace the origin of the symptoms to a certain organ or a certain region in the abdominal cavity. With stomach symptoms predominant, cancer is particularly to be borne in mind in any chronic case, for the great frequency of cancer of the stomach can never be forgotten. But with intestinal symptoms the striking ones, cancer is less prominent in the diagnostic possibilities, because the intestinal tract is so much less frequently the site of malignant disease. Furthermore, in the long distance between the pylorus and the anus certain parts are much more susceptible than others to cancer, so that within the intestinal tract the part to which the symptoms point again helps us to determine the probability that cancer exists. About this probability of cancer in different parts of the intestine, as well as about the evidence that speaks for the disease in each part, one must think very carefully if an early accurate diagnosis is to be made, for only early diagnosis makes surgical cure a probability.

A. Cancer of the Duodenum. This is a very rare site for malignant disease. Nevertheless, the symptoms produced when the disease does occur are so striking that the interpretation ought to be easy. Like cancer elsewhere in the body, the growth here produces such general manifestations as anemia and cachexia, pain and often a palpable tumor; the pain and tumor are usually located in the upper right quadrant of the abdomen, more accurately in the right hypochondrium and epigastrium. In addition, certain special symptoms arise, according to the part of the duodenum involved. Boas classifies duodenal growths with reference to the biliary papilla into three varieties: (1) Suprapapillary, (2) circumpapillary (3) infrapapillary.

1. In *suprapapillary* cancer, no localizing symptoms arise until stenosis of the bowel results. As soon as stenosis occurs, the symp-

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toms and signs become those of stenosis of the pylorus, with dilated stomach, and it is usually impossible to decide clinically whether the cancer originated at the pylorus or below it. In such a case—with general symptoms of cancer, such as anemia, cachexia, and loss of weight; with localizing symptoms, such as pain and a palpable tumor in the right hypochondrium; with special symptoms, such as food retention and repeated vomiting of stagnating contents; and the physical signs of dilated stomach, such as tumor, peristaltic wave, succussion splash and the proof of food retention by the stomach tube—a diagnosis of cancer at the pylorus would almost certainly be made, and in most instances it would be correct, because of the much greater frequency of cancer there than in the suprapapillary portion of the duodenum.

2. *Circumpapillary* cancer furnishes a new and prominent symptom—jaundice; with anemia, cachexia, and loss of weight as before; tumor in the right hypochondrium; but less pain as a rule and less of the former gastric manifestations. Jaundice is progressive and ultimately profound; and the symptoms characteristic of this condition become the predominant ones. Differentiation from malignant disease originating in the common duct, or in the head of the pancreas, or in the lower portion of the liver, would in such a case be practically impossible. Minute points of difference can be cited, but speaking from the view-point of these other conditions, the distinguishing marks are of little real value.

3. *Infrapapillary* cancer introduces still other characteristic symptoms and signs into the clinical picture. Stenosis of the duodenum below the papilla leads to stasis of the bile and pancreatic juice, their regurgitation into the stomach and their rejection from the body by vomiting. There is a large epigastric distention due to dilatation not only of the stomach but of the duodenum above the point of obstruction; copious vomiting of dark brown material resembling bile, neutral or alkaline in reaction and responding to chemical tests for bile; the presence in the fasting stomach in the morning of quantities of this same fluid, even though the organ has been carefully washed out the night before; and stools that are white and lacking in bile. This combination of symptoms and signs corresponds to no other condition exactly, though it resembles most closely acute dilatation of the stomach, and at first may be mistaken for it. The persistence of the symptoms; the development of a tumor in the epigastrium; the absence of bile from the stools; and the occurrence of increasing cachexia and malnutrition should serve to identify the case as one of duodenal cancer.

After all, two facts afford us consolation when we consider the difficulties and uncertainties of diagnosis in duodenal cancer; (1) that cancer in this part of the bowel is extremely rare; and (2) that all the conditions resembling it closely and causing the confusion in decision, demand operation for relief, and no fatal mistake can be made by advising surgical intervention when in doubt.

B. Cancer of the Jejunum and Ileum. According to all observers, cancer is rare in the ileum and still more rare in the jejunum. The whole of the small intestine seems singularly exempt from attack, as compared with the stomach above and the colon and rectum below. It is fortunate that this is so, for the jejunum and ileum particularly are difficult of investigation and their ailments hidden from observation. Cancer in this part of the bowel, as elsewhere, causes anemia, cachexia, and malnutrition; with localizing symptoms, such as attacks of colic, alternating constipation, and diarrhœa, sometimes hemorrhages, but nothing to point to the small intestine rather than the large as the site of the disease. Even when a tumor is palpable, as it most often is not, we have no positive way of determining its site. But in such a discouraging condition of affairs it again is a comfort to reflect that cancer in the small intestine, at least below the duodenum, is almost never found, not only by the clinician, but also by the surgeon and the pathologist.

C. Cancer of the Colon. Beyond the ileocecal valve the incidence of cancer rapidly increases, and we come into the presence of a lesion fairly common. To prove that this is not merely an individual experience, the statistics collected by Brill[2] are convincing, for he found that out of 3,563 cases of intestinal cancer reported by various observers, only 89, or 2.5 per cent., were in the small intestine. Nothnagel[3] records that out of 343 cases of carcinoma of the intestine discovered during twenty-four years among the autopsy material of the Pathological Institute of the General Hospital in Vienna, only 17 were in the small intestine—less than 5 per cent. In the investigation of any case suspected to be intestinal cancer, we start, therefore, with the probabilities all against a growth above the ileocecal valve. As with all diagnosis, our data here are obtained from two sources—subjective and objective evidence—the patient's story and our own observations.

I. The Subjective Evidence. The clinical history of cancer of the colon is based largely upon increasing obstruction of the bowel caused by the growth; and the symptoms are mainly those of stenosis. The three complaints most often heard are of increasing constipation, flatulent distention, and recurring attacks of colic. Each of these is of great importance, but none alone is sufficient to cause more than suspicion; while even the coincidence of all three does not afford certainty without the other data furnished by various methods of examination.

1. *Increasing Constipation.* This is usually the first symptom to attract the patient's attention. Previously regular about daily defecation, he gradually comes to require the aid of laxatives; these gradually fail to act; the constipation grows more and more

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[2] Amer. Jour. Med. Sci., 1904, cxxviii, 824.

[3] Diseases of the Intestines and Peritoneum, Nothnagel's Encyclopedia, p. 413.

obstinate; the patient finds the greatest difficulty about getting the bowels to move at all; and at last there occurs complete occlusion. The following case illustrates this very common history:

CASE I.—A man, aged fifty-six years, was seen in June, 1907. His chief complaint was obstinate constipation. This had begun five or six years before, gradually increased in severity, and had been worse for the last year than ever. For six months he did not have a voluntary passage, and had taken all sorts and kinds of physic in increasing doses, more and more being required to produce any effect. Recently he had become "run down," weak, easily tired by exertion, and had lost ten pounds in weight. He had no pain until the last month before he sought advice, but during that time recurring attacks of what he called "the gripes." Over the left side of the abdomen, in the course of the descending colon, there were found numerous discrete lumps, movable and not tender, evidently retained feces. No other tumor was palpable. Operation revealed a malignant growth involving the sigmoid flexure and descending colon, hard and firmly adherent, too extensive for removal. The patient died a few months later.

2. *Flatulent Distention.* This by itself is by no means a sign of cancer of the colon. In fact, it more often means something else. When persistent, it almost invariably means the retention of fecal masses in the colon, and disappears most certainly after a brisk purge. The danger is that the diagnosis will not go beyond this fecal retention, and that the cause of it will be overlooked, particularly if chronic constipation is associated, this apparently explaining both the fecal accumulation and the flatulent distention. The following case shows how flatulence may be practically the only symptom and how cancer of the colon may for months give little other sign of its presence.

CASE II.—A man, aged sixty-two years, first consulted me in December, 1906, complaining that he awakened every morning early with a feeling of distention and tightness in his abdomen. This so annoyed him that he always had to rise and stir about; but as soon as his bowels moved, and gas was passed freely, he had no further trouble during the day. This difficulty had been going on every morning for months. Otherwise he felt well, and had no complaint to make. He was a very large, rather corpulent man, florid and apparently in perfect health. There had been no loss of weight. The abdominal examination, repeatedly made, was always negative as regards tumor or tenderness, but the bowels were always found distended with gas. They moved regularly every day, and various laxatives advised only caused diarrhœa and cramps, but did not prevent the flatulent distention. Finally, in April, 1907, after taking castor oil one evening, violent pains were set up, and continued all night. The next morning the abdomen was found greatly distended, rigid, and tender; the pulse rapidly grew irregular and weak, and in a few hours the patient died. Autopsy showed a rent in the ascending colon near the hepatic flexure, with escape of a large quantity of feces into the peritoneal cavity, and a nodular carcinomatous constriction, annular, hard, and practically occluding the lumen, just beyond the rent.

3. *Recurring Attacks of Colic.* These do not always occur. When they do, they are usually associated with alternating constipation and diarrhœa. The bowels for a time are very obstinate and refuse to respond to laxatives; then comes a sharp attack of colic, with diarrhœa and profuse discharges. This is followed by another period of constipation, terminating sooner or later in colic and diarrhœa. In the interval between attacks there is usually no pain at all. Such a history does not necessarily mean cancer of the colon, but it does mean stenosis of the large bowel, fecal accumulation, increased peristalsis due to mechanical irritation, and emptying of the retained contents. Ultimately the time arrives when the stenosis cannot be overcome by these more violent waves of colicky peristalsis, and complete intestinal obstruction occurs, and possibly rupture of the bowel, as in the case last reported.

4. Finally, certain symptoms expected in the clinical history of cancer elsewhere must not be looked for in cancer of the colon until very late, and their absence must not mislead. There is usually no loss of weight in consequence, and nutrition is but little disturbed. The patient does not complain of weakness or exhaustion. There may be no noticeable anemia or cachexia, and the appearance continues to be that of health. Pain is usually absent, except during the attacks of colic. In fact, before the development of marked mechanical interference with the lumen of the bowel, cancer of the colon gives little sign of its presence, and it is not until late in its history, when metastases to other organs have already occurred, and operative interference is practically useless, that the disease is usually discovered.

II. THE OBJECTIVE EVIDENCE. This includes all that can be found out about cancer of the colon by various methods of examination. These methods comprise physical examination of the abdomen, examination with the *x*-rays, and examination of the feces and of the blood.

1. *Physical Examination of the Abdomen.* The whole object of this is to discover whether or not a tumor is palpable, and if it is found, to ascertain whether it is really a growth arising from the colon. (*a*) When no tumor is found, the diagnosis of cancer of the colon nevertheless cannot be set aside, for the annular carcinoma, encircling the bowel with a ring of hard, sclerotic tissue, may be absolutely incapable of detection by palpation through the abdominal wall, particularly if the wall is thick with fat or if the intestines are constantly distended by gas, as in Case II. Or, the tumor may be so situated that it is inaccessible for palpation, as beneath the liver or other intestinal coils. But repeated attempts should be made to

discover a tumor, before a decision is reached that it does not exist, and under special conditions, as well as under ordinary ones—for instance, after free purgation with castor oil and fasting for twenty-four hours, or in a hot bath to relax the abdominal walls, or under anesthesia. (*b*) When a tumor is found, there are no characteristics that positively identify it as connected with the colon. In size, it may be very small or very large. In consistence, it is usually very hard and cartilaginous, but so are cancerous growths within the abdomen arising from other organs. In form, it may be irregular and nodular, or rounded and smooth. In sensitiveness, it is usually tender to pressure, and may be extremely so; but, on the other hand, it may be handled without causing any pain at all. In mobility, it usually can be freely carried about within the abdomen by the examining hand; but if adhesions have formed, fastening the tumor to some adjacent organ or to the abdominal wall, it becomes quite fixed, and immobility of a tumor, therefore, does not negative the diagnosis of cancer of the colon. As regards position, it may be found in any part of the abdomen.

In the absence of any distinguishing characteristic on palpation, to assure the diagnosis of cancer of the colon, other means of physical examination must be employed for identification and other possibilities must be eliminated. The colon should be inflated with air, to determine the relation of the tumor to the bowel. Castor oil and high enemas should be employed to prove that the tumor is not fecal. The stomach should be inflated, and a test meal given to learn whether the tumor is possibly gastric. The kidneys should be catheterized if the slightest doubt exists as to whether the tumor is renal. A blood count will help to prove that the tumor is not splenic. Percussion and palpation with the patient in different positions will usually show when the tumor is hepatic—such as a Riedel's lobe. Finally, the employment of the other methods of diagnosis, presently to be described for cancer of the colon, will greatly aid in the identification.

As an instance, however, of the possibilities for error when a tumor is found, the following case is significant:

CASE III.—A woman, aged forty-five years, was seen in consultation in October, 1900, on account of dragging pain in the right side of the abdomen and back; she had lost slightly in weight, was constipated, and had symptoms of dyspepsia. In the right upper abdomen a tumor was found, corresponding in size, shape, and location to a prolapsed kidney. She was examined during her illness by seven different physicians and surgeons, who all agreed that she had a prolapsed kidney, the only question being whether the kidney was likewise diseased. It was finally decided that the organ was tuberculous, mainly on the testimony of a pathologist who claimed to have found tubercle bacilli in the urine, and that, therefore, the kidney should be removed. At the operation it was found that the tumor was a cancer of the ascending colon, and that the kidney was in normal position and perfectly sound. The growth was removed, but the patient died a few months later from recurrence.

2. *Examination by the X-rays.* When this method of diagnosis has been desired, I have always referred my cases to someone expert in its use, for the making of the plates and for the interpretation of their meaning. I have, therefore, asked my associate, Dr. Charles M. Cooper, who has charge of the *x*-ray department at Lane Hospital, and whose experience is very large, to outline the method and its value in cancer of the colon. He writes as follows: "In the early diagnosis of cancer of the colon the *x*-rays are of little or no assistance. It is only after obstructive symptoms have developed that we can hope to show the delay point in the passage of the bismuth meal. Even then the interpretation is subject to fallacies, and must only be given special significance when in agreement with the clinical deductions. The demonstration of the nature of the obstructive agent presents still more difficulties. It is probable, however, that a comparison of radiograms of the bismuth-containing colon and of the air-filled colon will be of assistance in the field of diagnosis. Regarding the methods employed, there are three: (*a*) A bismuth test meal is administered by the mouth. This may consist of boiled rice, potato puree, barley broth, or minced meat, according to the desires of the patient. The amount for an adult is 400 grams by weight. One or two ounces of bismuth subcarbonate or oxychloride are rubbed up into a thin paste, with water or milk, and the food added little by little to the bismuth suspension, with which it is well mixed. The meal should be served warm. Normally, within six hours this has filled the cecum and the ascending colon. The whole colon is gradually filled, and twenty-four hours after the meal is taken the radiogram is made. (*b*) The bismuth may be given through the anus. Castor oil is administered the evening before and a cleansing enema the next morning. Then an enema is slowly introduced, consisting of a pint of mucilage of acacia to which one or two ounces of bismuth subcarbonate or oxychloride has been added. The tube should be of big bore, and it is only necessary to introduce it just past the anal canal. The bag containing the enema should not be more than one foot above the level of the buttocks. The patient rests on the back for forty-five minutes, and then the radiogram is made. (*c*) Examination may be made without the bismuth. If the bowels have been thoroughly evacuated, and the colon be partially distended with air through the rectum, radiograms can be obtained which outline very distinctly the ascending and descending colon. The sacculations and the separating folds may be very clear. The transverse colon does not lend itself so well to this method of investigation. Interpreting the plates obtained by any method, the points to be studied are: the extent of colon occupied by the bismuth mixture; the position of the colon; the uniformity of the

bismuth shadow; and the relationship of the colon to the other intra-abdominal organs."

3. *Examination of the Feces.* This no longer means simply an inspection of the bowel discharges, with reference to possible peculiarity in contour, such as flattened, ribbon-shaped, or pencil-shaped stools. These are significant of stenosis if they are found, but the stools may be normal in appearance, even with a large growth. Of more importance is the examination for mucus, pus, and blood. *Mucus* by itself is of little importance, for it is found in a great variety of intestinal conditions. *Pus* is of much more significance, but cannot be expected unless ulceration of the tumor has taken place. Even so, its presence means only ulceration of some kind, not necessarily cancerous; while its absence by no means negatives the diagnosis, for the growth may not have broken down. *Blood* may be found when no ulceration has occurred, from oozing or from traumatism by hardened feces, but it may be absent throughout the whole course of the disease In any event, the amount is usually small and occult, mixed intimately with the feces. It is the combination of mucus, pus, and blood in the feces that is particularly significant. Persistence of this combination always means one of three things: cancer of the colon, dysenteric ulceration (especially amœbic), or an abscess that has ruptured into the bowels from some other viscus.

4. *Examination of the Blood.* The blood picture in cancer of the colon is that of a secondary anemia, with moderate leukocytosis, the differential count showing a relative increase of the polymorphonuclears. Naturally, no inference can be drawn from this evidence taken alone, but it is of value in connection with the other data, both for direct and differential diagnosis.

D. CANCER OF THE RECTUM. Malignant newgrowth originating in the sigmoid flexure or below is one of the most insidious diseases which we ever meet, and almost, as a rule, it has advanced beyond the stage of operability before it gives rise to symptom that lead the patient to seek advice. It does not cause anemia, cachexia, or loss of weight and strength until late in its history, and its local manifestations may be altogether overlooked for a long time. These local manifestations occur in several groups: (1) Those due to bowel obstruction; (2) those due to pressure on surrounding parts; and (3) those due to ulceration of the newgrowth. The symptoms arising from bowel stenosis are very much the same as those occurring when the growth is higher in the colon, namely, increasing constipation, flatulent distention, and paroxysms of pain. These complaints may be the only ones, as they were in the following case:

CASE IV.—A man, aged sixty-seven years, seen in October, 1908, complained that for three months he had been annoyed by increasing difficulty in getting his bowels to move. He had not much pain except after cathartics were taken, but felt full of wind all the time, and bloated. His appetite was good, and he had not lost appreciably in weight. His abdomen was corpulent and its walls thick, so that palpation was difficult; but distinctly greater resistance and tenderness were found in the right lower quadrant than elsewhere. As no satisfactory evacuation of the bowels could be produced by cathartics or enemas, exploratory laparotomy was advised. This revealed a large, hard, inoperable carcinoma, filling the upper pelvis, apparently originating from the sigmoid flexure. The mass felt in the right lower quadrant, between the crest of the ilium and Poupart's ligament, was found to consist of enlarged retroperitoneal glands.

The symptoms in another case may be largely those from pressure of the growth upon surrounding parts. Pain in the region of the sacrum and the lower back, bladder irritation and tenesmus, or pain in the distribution of the sciatic nerve result. These symptoms may be added to those mentioned in the first group, and so serve to throw light upon the situation of the growth; or they may be the only ones of which complaint is made.

In still another group of cases the earliest manifestations are those due to ulceration, and in these the principal complaint is of chronic diarrhœa or bloody discharges, or both. Quite a common history is one of several loose passages each morning after rising, often with tenesmus, until the rectum is empty, and then no farther trouble until the following day. These passages consist of mucopurulent material mixed with the feces. With this history there is commonly complaint of increasing weakness and pallor, possibly of pain in the lower back and of urinary disturbance. Finally, the symptom that first alarms the patient may be the passage of bright red blood. Even then the condition is only too often assumed to be nothing but piles, until discovery of the true state of affairs comes too late. The following case shows what sort of history may be expected from this group:

Case V.—A woman, aged seventy-five years, seen in September, 1907, stated that about five years previously she began to notice clots of blood in her bowel movements, and at times bright red blood. This had continued at intervals ever since. At the time she sought advice she was passing bright red blood every day; in fact, it came then even without bowel movements, and she had to wear a cloth all the time, even at night, because pus and blood ran constantly from the bowel. Besides this she had pain in the rectum now and then, but not constantly; a sense of pressure and fulness there most of the time, and particularly when at stool. The bowels were obstinately constipated, and when she took physic for relief, she had many passages, with great tenesmus and suffering. She had lost about fifty pounds in weight within the last two years. Rectal examination showed an irregular, hard growth about the size of a turkey's egg, situated about three inches above the anus, with soft, necrotic edges around the lumen of the bowel. Operation was advised, but declined. Six months later I saw her again in consultation, when a large tumor mass almost completely filled the pelvis. She died soon afterward.

One of the curious facts about cancer of the colon and rectum is the early age at which it may occur. The following case is of special interest in this connection, as well as for its manifesting itself first by hemorrhage:

CASE VI.—A man, aged thirty years, seen in July, 1907, complained that for months previously he had noticed after stool that there would be a little bright red blood at the anus, but not constantly. But a few days before I saw him he had passed a large quantity of bright red blood, with some clots, and this gave relief to a pain he had previously been having in his back. Since then bleeding had persisted every day in greater or less quantity. He was a large, well-nourished man, and no abnormality whatever was found in the abdomen, except tenderness low down on the left side over the descending colon. Rectal examination showed a tumor filling up the bowel, situated mostly on the anterior wall, irregular in contour, about four inches from the anus. Operation was advised but refused. I saw him again, in consultation, in the following November. In the meantime he had been treated by a Chinese doctor until complete obstruction of the bowel occurred, then had been compelled to seek the advice of a surgeon, who did a left inguinal colostomy. At this second examination he was found to have a large tumor practically filling the entire pelvis—tender, irregular, nodular, with bloody, purulent discharge—and had become greatly emaciated and weakened. A portion of the growth removed for pathological examination was shown to be carcinoma.

As aids to diagnosis in cancer of the rectum there are all those mentioned for cancer of the colon; but there is one other available here that was not available there, namely, rectal examination. In rectal carcinoma, abdominal examination may show no abnormality whatever, until such time as a very large tumor has developed, or masses of enlarged glands present themselves, or the liver is involved by metastasis, or ascites has occurred from general peritoneal carcinosis. For a long time the most careful abdominal palpation may reveal no tumor, because it is hidden below the brim of the pelvis; but during all this time examination through the anus will at once reveal the tumor's presence. This examination should be first by digital palpation; or if this is negative, then the cylindrical rectal speculum should be used and the parts inspected, as can be done with the sigmoidoscope even as high as ten or twelve inches from the anus. The routine rectal examination in every case of chronic digestive disturbance will often save the diagnostician from grievous error as well as the patient from fatal delay, until his case is beyond surgical aid. This suggestion of rectal examination as a regular part of the investigation, whether symptoms seem to call for it or not, is by no means a new idea; yet the procedure is constantly forgotten. A careful clinical history should always be obtained; examination of the abdomen in every part should never be omitted; *x*-ray plates after bismuth injections should be remembered in all obscure cases; the discharges from the bowel should be examined not only by gross inspection, but also chemically and by the microscope; and the complete blood count should be made by an expert. But all these means of reaching a diagnosis may fail to reveal the existence of cancer of the rectum, when simple rectal examination would have shown its presence at once.

In conclusion, I repeat the sentences with which this paper began: that in considering the cause of any chronic digestive disorder, cancer can never be left entirely out of account, and can never be eliminated from the calculation until after all the evidence has been obtained and carefully weighed. To this conviction I would add one other, that no examination for any chronic digestive disorder is complete until a rectal examination has been made.

THE ROUTINE EXAMINATION OF THE ŒSOPHAGUS.

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Until comparatively recently an analysis of the symptomatology and an examination of the œsophagus with sounds of divers make and form exhausted our means of investigating this tube. The association of the knowledge so acquired, with the postmortem findings, has led to the establishment of certain fundamental facts, an acquaintance with which is essential prior to our investigation.

From such we cull the following:

1. Difficulty of swallowing is the overwhelmingly important symptom indicative of a lesion of, or interference with, the œsophageal tube.

2. Of every 100 patients who come complaining of this symptom, from 60 to 90 suffer from malignant disease. This comprises from 5 to 6 per cent. of all carcinomas. Of persons so afflicted, over 70 per cent. are males. This raises the question whether syphilis does not play as important a role in the etiology of cancer of the œsophagus as it is now believed to play in cancer of the tongue. Of these carcinomas, 10 per cent. arise in the cervical region, 40 per cent. at the bifurcation of the trachea, 30 per cent. at the lower end, while the remaining 20 per cent. are really instances